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भारतीय मानक
बॉय शॉकल — विशिष्टि
(पहला पुनरीक्षण)

Indian Standard
BUOY SHACKLES — SPECIFICATION
(*First Revision*)

ICS 47.020.99

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BUREAU OF INDIAN STANDARDS
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Price Group 3

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Inland Harbour Crafts and Fishing Vessels Sectional Committee had been approved by the Transport Engineering Division Council.

This standard was first published in 1968. In this revision nominal sizes have been restructured besides changes in requirement of materials.

Buoy shackles are one of the attachments used with anchor chains for mooring the ships to mooring buoys.

In the formulation of this standard, considerable assistance has been derived from the following:

JIS F 3306 : 1995 'Buoy shackles', issued by the Japanese Industrial Standard Committee.

This standard is one of the series of Indian Standards on electrically welded anchor chains and accessories. The other standards in this series are:

<i>IS No.</i>	<i>Title</i>
4484 : 1967	Specification for electrically welded stud link anchor chains and attachments
4692 : 1968	Specification for electrically welded studless link anchor chains and attachments

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

BUOY SHACKLES — SPECIFICATION

(*First Revision*)

1 SCOPE

This standard specifies buoy shackles used for mooring ships to buoys.

2 REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

<i>IS No.</i>	<i>Title</i>
2062 : 2006	Hot rolled low, medium and high tensile structural steel (<i>sixth revision</i>)
3261 : 1980	Carbon steel forgings for shipbuilding industry (<i>first revision</i>)
6967 : 1973	Specification for steel for electrically welded round link chains

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 Mooring Buoy Shackle — This is the shackle used in connecting anchor chains to the mooring buoys.

3.2 Nominal Size — Nominal size of the mooring buoy shackle is the actual diameter of the anchor chains with which the shackle is to be used.

4 CLASSIFICATION

The buoy shackles shall be classified in Type A and Type B according to their shapes.

5 CONSTRUCTION, SHAPE AND DIMENSIONS

The construction, shape and dimensions shall be as shown in Fig. 1 Table 1 and Fig. 2 Table 2.

6 PERMISSIBLE DEVIATION

The permissible dimensional deviation shall comply with the following requirements:

- a) The permissible dimensional deviation of diameters shall be within $^{+0.5}_0$ percent.
- b) The permissible dimensional deviation of diameters shall be within $^{+0.5}_0$ percent d mm (' d ' being the nominal diameter of anchor chain cable).

7 MATERIAL

The materials shall be as given in Table 3 and Table 4.

8 METHOD OF MANUFACTURE

The method of manufacture shall comply with the following requirements:

- a) Buoy shackles shall be manufactured by forging or casting; and
- b) Cast steel buoy shackle shall be manufactured by electric furnace and heat-treated by annealing, hardening, tempering or other suitable methods.

9 TESTS AND INSPECTION

9.1 Material Inspection

The buoy shackles shall be subjected to the material inspection in accordance with the reference standard of Table 3 and Table 4, if cast steel is used for body and/or pin.

9.2 Proof Inspection

The buoy shackles shall be subjected to the proof load as given in Table 5 and shall show no sign of flaws, cracks or other defects.

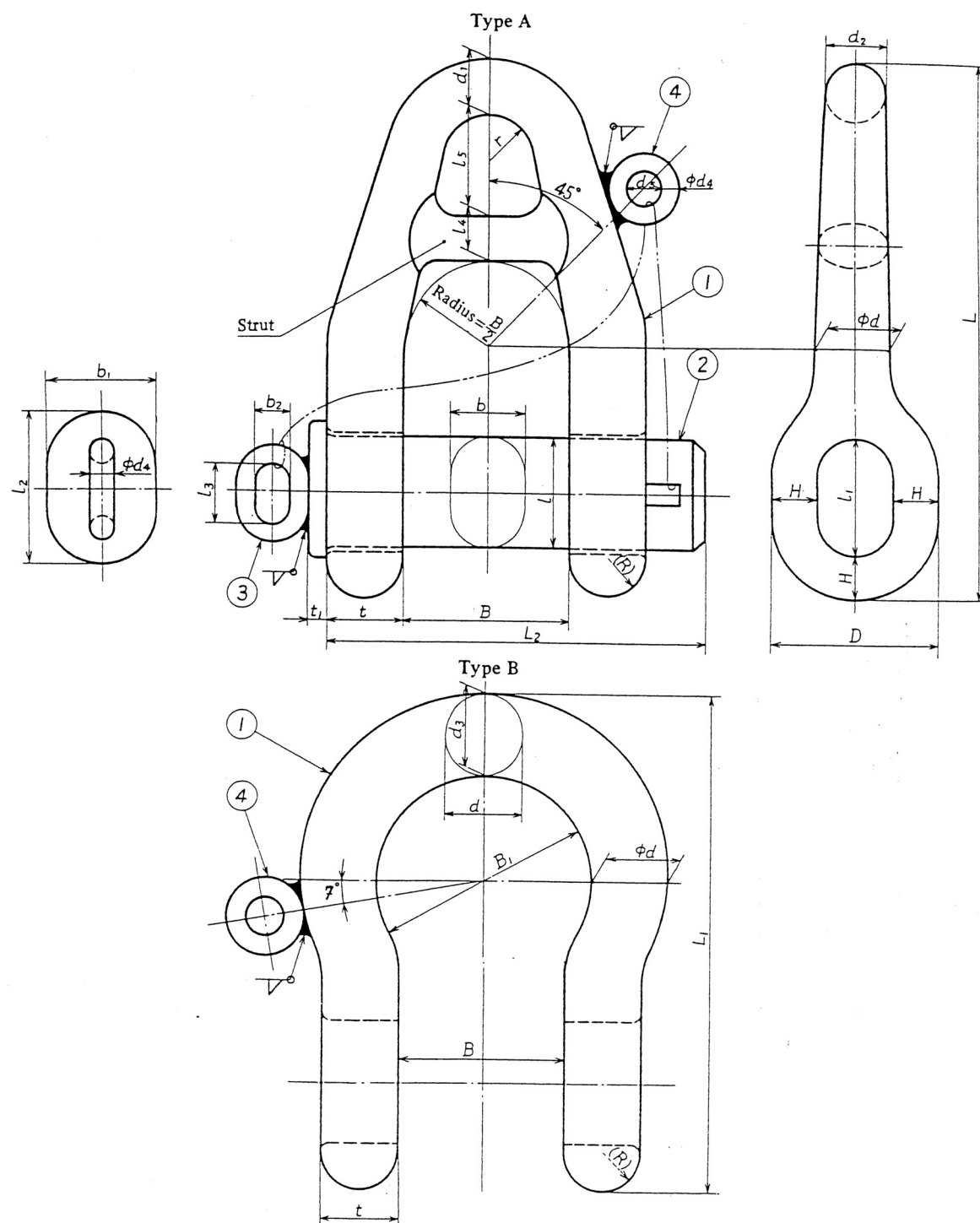
9.3 Dimensional Inspection

The buoy shackles shall be inspected visually and examined for dimensions after proof inspection and shall satisfy all of the requirements in 4.

10 DESIGNATION

The buoy shackles shall be designated by the title/IS No., type, class and nominal size.

Example : Buoy shackles Type A Class 2-38 or IS 4690 A 2-38.



NOTES

- 1 When the body is made of forged steel, strut may be welded provided that it shall be annealed after welding.
- 2 Eye (4) may be welded.
- 3 Pin (2) shall be easy of being taken out and put in from either side.
- 4 The position of eye (4) may be changed as specified by the purchaser.

FIG. 1 BODY AND PIN OF BUOY SHACKLE

Table 1 Dimensions for Type A and Type B Buoy Shakles
(Clause 5)

Sl No.	Nominal Size	Nominal Dia of Applicable Anchor Chain Cable mm	Body, Pin, Eye for Pin and Eye, mm																										Reference Calculated Mass, kg	
			d	d_1	d_2	d_3	d_4	d_5	D	B	B_1	b	b_1	b_2	H	L	L_1	L_2	L	l_1	l_2	l_3	l_4	l_5	R	r	T	t_1	Type A	Type B
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)
i)	38	38	56	38	42	60	13	28	113	150	188	53	65	28	29	395	375	306	80	82	92	40	28	68	30	32	56	12	27.8	26.0
ii)	40	40	58	40	44	62	13	28	118	150	188	56	68	28	30	406	384	309	83	85	95	42	29	72	32	34	58	12	31.2	29.9
iii)	42	42	59	42	46	63	13	28	125	150	188	59	71	28	32	416	394	313	85	87	97	43	30	75	34	36	59	12	35.2	34.0
iv)	44	44	62	44	48	66	16	30	130	150	188	62	74	30	33	427	401	320	88	90	100	44	31	79	35	37	62	14	40.6	39.3
v)	46	46	64	46	51	69	16	30	136	150	188	64	78	30	35	438	410	325	90	92	104	45	32	83	37	39	64	14	45.9	44.5
vi)	48	48	67	48	53	72	16	32	141	160	200	67	81	32	36	458	429	343	92	94	106	46	34	86	38	41	67	14	52.4	50.6
vii)	50	50	70	50	55	75	16	32	148	160	200	70	84	32	38	470	440	350	95	97	109	48	35	90	40	43	70	16	59.4	56.9
viii)	52	52	73	52	57	78	16	34	153	170	213	73	88	34	39	490	460	368	98	100	112	49	36	93	42	44	73	16	66.9	64.2
ix)	54	54	76	54	59	81	16	34	161	170	213	76	92	34	41	504	472	375	101	104	117	50	38	97	43	46	76	16	74.3	71.5
x)	56	56	78	56	62	84	16	36	165	180	225	78	94	36	42	524	491	393	104	107	120	52	39	100	45	48	78	16	83.0	80.0
xi)	58	58	81	58	64	87	19	36	172	180	225	81	97	36	44	538	503	400	108	111	124	54	41	104	46	49	81	18	92.5	89.3
xii)	60	60	84	60	66	90	19	36	177	180	225	84	101	36	45	549	513	408	111	114	123	56	42	108	48	51	84	18	102	98.7
xiii)	62	62	87	62	68	93	19	36	184	180	225	87	104	36	47	561	525	416	115	118	132	58	43	111	50	53	87	18	113	109
xiv)	64	64	90	64	70	96	19	38	189	200	250	90	107	38	48	594	556	443	119	122	136	60	45	115	51	54	90	18	123	119
xv)	66	66	92	66	73	99	19	38	195	200	250	92	109	38	50	606	566	451	122	125	139	61	46	119	53	56	92	18	136	131
xvi)	68	68	95	68	75	102	19	38	200	200	250	95	114	38	51	617	576	456	125	128	144	63	48	122	54	58	95	20	148	143
xvii)	70	70	98	70	77	105	21	42	207	200	250	98	117	42	53	628	586	466	127	130	146	64	59	126	56	59	98	20	161	154
xviii)	73	73	103	73	80	109	21	42	215	200	250	102	122	42	55	645	601	478	132	135	152	66	51	132	59	62	103	20	182	175
xix)	76	76	106	76	84	113	21	42	223	200	250	106	127	42	57	663	615	490	137	140	158	69	53	137	61	65	106	20	205	197
xx)	78	78	109	78	86	116	23	42	230	200	250	109	130	42	59	675	625	496	140	143	161	70	55	140	62	66	109	22	222	213
xxi)	81	81	112	81	89	119	23	46	242	200	250	114	136	46	62	697	641	510	146	150	168	74	57	147	65	69	113	22	250	239
xxii)	84	84	115	84	93	122	25	46	251	200	250	119	143	46	64	716	655	519	152	156	171	77	59	153	68	72	116	24	279	368
xxiii)	87	87	118	87	96	127	25	46	259	200	250	123	147	46	66	735	670	528	158	162	182	78	62	158	70	75	119	24	311	298
xiv)	90	90	122	90	99	130	25	46	267	200	250	127	151	46	68	753	684	540	164	168	188	80	64	163	73	77	123	24	345	332

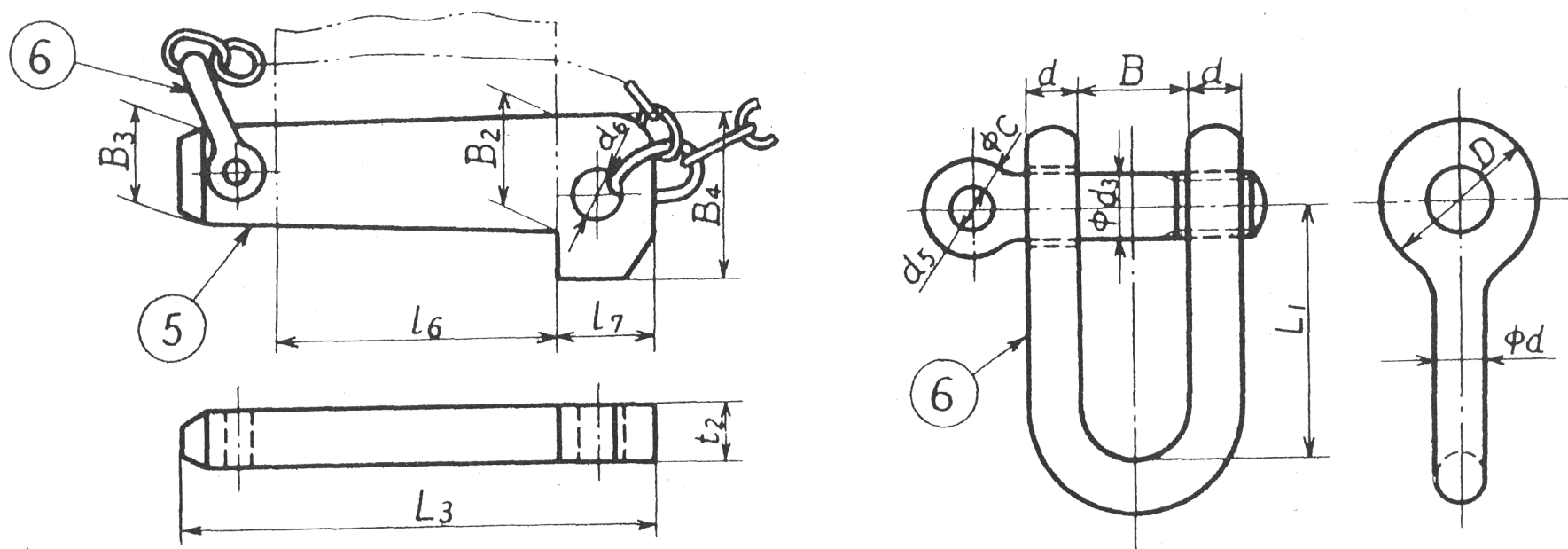


FIG. 2 COTTER AND SHACKLE

Table 2 Dimensions of Cotter and Shackles

(Clause 5)

All dimensions in millimetres.

Sl No.	Nominal Size	Nominal Dia of Applicable Anchor Chain Cable	Cotter								Shackle						
			L_6	l_7	B_2	B_3	B_4	d_6	L_3	t_2	D	B_1	DL_2	L_1	d_3	b_5	c
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
i)	38	38	53	19	24	21	33	12	98	10	8	14	21	32	10	7	4
ii)	40	40	56	20	25	22	34	12	103	12	8	14	21	32	10	7	4
iii)	42	42	59	21	26	23	35	14	111	13	10	17	25	45	12	8	5
iv)	44	44	62	22	27	24	36	14	115	13	10	17	25	45	12	8	5
v)	46	46	64	22	28	25	38	14	118	14	10	17	25	45	12	8	5
vi)	48	48	67	23	29	26	39	14	122	14	10	17	25	45	12	8	5
vii)	50	50	70	24	30	27	40	18	133	15	12	20	32	48	15	10	5
viii)	52	52	73	25	31	28	41	18	137	15	12	20	32	48	15	10	5
ix)	54	54	76	26	32	29	44	18	142	16	12	20	32	48	15	10	5
x)	56	56	78	27	33	30	45	18	145	16	12	20	32	48	15	10	5
xi)	58	58	81	28	34	31	46	20	153	17	14	24	36	56	17	12	6
xii)	60	60	84	29	36	33	48	20	158	18	14	24	36	56	17	12	6
xiii)	62	62	87	30	38	35	50	20	162	19	14	24	36	56	17	12	6
xiv)	64	64	90	31	39	36	51	20	167	19	14	24	36	56	17	12	6
xv)	66	66	92	32	40	37	54	20	170	20	14	24	36	56	17	12	6
xvi)	68	68	95	33	41	38	55	20	174	20	14	24	36	56	17	12	6
xvii)	70	70	98	34	42	39	56	22	182	21	16	26	40	64	19	14	7
xviii)	73	73	103	35	43	40	57	22	188	21	16	26	40	64	19	14	7
xix)	76	76	106	36	44	41	58	22	193	22	16	26	40	64	19	14	7
xx)	78	78	109	36	45	42	60	24	201	23	18	29	45	72	21	16	8
xxi)	81	81	114	38	49	45	65	24	207	25	18	29	45	72	21	16	8
xxii)	84	84	119	39	51	47	68	24	216	25	18	29	45	72	21	16	8
xxiii)	87	87	123	40	53	48	70	25	221	26	18	29	45	72	21	16	8
xxiv)	90	90	127	40	53	49	70	25	225	26	18	29	45	72	21	16	8

Table 3 Material for Various Components of Anchor Chain

(Clause 7)

Sl No.	Component	For Class 2 Anchor Chain	For Class 3 Anchor Chain
(1)	(2)	(3)	(4)
i)	Body	IS 6967, IS 3261, C 25 Mn 75, 20 Mn2 or Cast	IS 6967, IS 3261, 35C8 to 55C8 20 Mn2 H and T
ii)	Pin	Steel as per Table 4	or Cast Steel as per Table 4
iii)	Eye of pin	E 250 of IS 2062	E 250 of IS 2062
iv)	Eye		
v)	Cotter		
vi)	Shackle for cotter		

Table 4 Material Requirement of Cast Steel for Body and Pin of Anchor Chain

(Clause 7)

Sl No.	Name of Materials	Tensile Test				Impact Test	
		Yield Point or Yield Strength N/mm ²	Tensile Strength N/mm ²	Elongation ($L = 5d$) Percent	Reduction of Area, Percent	Test Temperature (°C)	Minimum Mean Value of Absorbed Energy (J)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Cast steel for Class 2 chain	295 or more	490-690	22 or more	—	—	—
ii)	Cast steel for Class 3 chain	410 or more	690 or more	17 or more	40 or more	0	60

NOTE — Absorbed energy value of 2 or more test pieces out of 1 lot test sample may be minimum mean values or more of absorbed energy specified in col 8, or any one piece of test sample may be 70 percent or more of specified value.

Table 5 Proof Test Loads
(Clause 9.2)

Sl No.	Nominal Size	Proof Test Load, kN	
		For Class 2 Anchor Chain	For Class 3 Anchor Chain
(1)	(2)	(3)	(4)
i)	38	581	812
ii)	40	640	896
iii)	42	703	981
iv)	44	769	1 080
v)	46	837	1 170
vi)	48	908	1 270
vii)	50	981	1 370
viii)	52	1 060	1 480
ix)	54	1 140	1 590
x)	56	1 220	1 710
xi)	58	1 290	1 810
xii)	60	1 380	1 940
xiii)	62	1 470	2 060
xiv)	64	1 560	2 190
xv)	66	1 660	2 310
xvi)	68	1 750	2 450
xvii)	70	1 840	2 580
xviii)	73	1 990	2 790
xix)	76	2 150	3 010
xx)	78	2 260	3 160
xxi)	82	2 410	3 380
xxii)	84	2 580	3 610
xxiii)	87	2 750	3 850
xiv)	90	2 920	4 090

11 MARKING

11.1 The buoy shackle shall be marked on the body with the following:

- Nominal size;
- Manufacturer's name or trade-mark;
- Inspection No.; and
- Standard Mark.

11.2 BIS Standard Mark

The product may also be marked with the Standard Mark.

11.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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